AD-A130 323 BLAST AND SHOCK FIELD TEST MANAGEMENT(U) AIR FORCE CONTRACT MANAGEMENT DIV LOS ANGELES CA M L NOBLE 29 JUN 83 AFCMD/82-018 1/1

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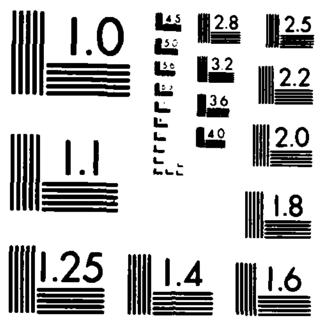

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

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PHYSICAL MODELING TECHNIQUES FOR MISSILE AND OTHER PROTECTIVE STRUCTURES

Papers Submitted for Presentation During the
American Society of Civil Engineers
National Spring Convention
Las Vegas, April 1982

Sponsored By the ASCE Engineering Mechanics Division
Committee on Experimental Analysis and Instrumentation

Edited By: T. Krauthammer and C. D. Sutton

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS BALLISTIC MISSILE OFFICE (AFSC)
NORTON AIR FORCE BASE CALIFORNIA 92409

REPLY TO ATTN OF: PA

29 Jun 83

SUBJECT: Review of Material for Public Release

TO: Mr. James Shafer
Defense Technical Information Center
DDAC
Cameron Station
Alexandria, VA 22314

The following technical papers have been reviewed by our office and are approved for public release. This headquarters has no objection to their public release and authorizes publication.

1. (BMO 81-296) "Protective Vertical Shelters" by Ian Narain, A.M. ASCE, Jerry Stepheno, A.M. ASCE, and Gary Landon, A.M. ASCE.

2. (BMO 82-020) "Dynamic Cylinder Test Program" by Jerry Stephens, A.M. ASCE.

3. (AFCMD/82-018) "Blast and Shock Field Test Management" by Michael Noble.

4. (AFCMD/82-014) "A Comparison of Nuclear Simulation Techniques on Generic MX Structures" by John Betz.

5. (AFCMD/82-013) "Finite Element Dynamic Analysis of the DCT-2 Models" by Barry Bingham.

6. (AFCMD/82-017) "MX Basing Development Derived From H. E. Testing" by Donald Cole.

7. (BMO 82-017) "Testing of Reduced-Scale Concrete MX-Shelters-Experimental Program" by J. I. Daniel and D. M. Schultz.

8. (BMO 82-017) "Testing of Reduced-Scale Concrete MX-Shelters-Specimen Construction" by A. T. Ciolko.

9. (BMO 82-017) "Testing of Reduced-Scale Concrete MX-Shelters-Instrumentation and Load Control" by N. W. Hanson and J. T. Julien.

10. (BMO 82-003) "Laboratory Investigation of Expansion, Venting, and Shock Attenuation in the MX Trench" by J. K. Gran, J. R. Bruce, and J. D. Colton.

11. (BMO 82-003) "Small-Scale Tests of MX Vertical Shelter Structures" by J. K. Gran, J. R. Bruce, and J. D. Colton.

12. (BMO 82-001) "Determination of Soil Properties Through Ground Motion Analysis" by John Frye and Norman Lipner.

13. (BMO 82-062) "Instrumentation for Protective Structures Testing" by Joe Quintana.

14. (BMO 82-105) "1/5 Size VHS Series Blast and Shock Simulations" by Michael Noble.

15. (BMO 82-126) "The Use of Physical Models in Development of the MX Protective Shelter" by Eugene Sevin.

*16. REJECTED: (BMO 82-029) "Survey of Experimental Work on the Dynamic Behavior of Concrete Structures in the USSR" by Leonid Millstein and Gajanen Sabnis.

Carol A. Schalkham

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DEPARTMENT OF THE AIR FORCE

BALLISTIC MISSILE OFFICE (AFSC)
NORTON AIR FORCE BASE, CALIFORNIA 92409

REPLY TO ATTN OF: MNNXH (Lt Kalansky/4771) 1 February 1980

SUBJECT: HAVE HOST Security Classification

TO: AFWL/DEO

1. The HAVE HOST test program during FY 80 is a simulation development and simulation comparison program. The structures provided for D-1 and SH-1 are generic structures and are neither an MX system design, nor representative of an MX design. Therefore, HAVE HOST does not provide a simulation test for an MX system design.

2. Applicable paragraphs in the MX Program Security Classification Guide are:

Section II Paragraphs 1, 2, 3, 4, 5

Section VII Part A Paragraph 1.i

Section XII Paragraphs 1, 3.f.(2)

Michael F. Baran

MICHAEL F. BARAN, Lt Col, USAF
Chief, Nuclear Hardness &
Survivability Division
Directorate of Engineering

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April 1980

ANNEX H - SECURITY CLASSIFICATION

OVERVIEW: This annex is the MX Security Classification Guide for the field test program conducted during the MX FSED Phase.

PURPOSE AND USE: This annex is essential; information relating to S/V issues of a future system is vital and must be protected for reasons of national security. Everybody associated with the MX system development must be thoroughly aware of this information. This annex governs primarily field test aspects of MX security; the "MX Program Security Classification Guide" covers all system aspects.

ANNEX EXECUTOR: Chief, Test Operations Branch; Civil Engineering Research Division, AFWL.

ANNEX REVISION: Revisions will be made when changes generated by SPO occur, or when clarification of points is indicated. Executor will accomplish, by adding amendments to the basic document. Update review and determination will be made quarterly.

SPECIFICS:

1. The basic appurtenant document is:

MX PROGRAM SECURITY CLASSIFICATION GUIDE (U), April 1979
Document is maintained in NTEO, Room 264, Bldg. 413.

Specific relevance and importance of the following portions is indicated:

Section II	P. 4, Release of Information
Section VIII	P. 18, Basing
Section XII	P. 32, Survivability

2. Additional guidance covering the Pre-FSD Blast and Shock Test Program has been received from BMO/MNNXH, and is quoted in Attachment 1 to this Annex.

ANNEX APPROVAL:

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BLAST AND SHOCK FIELD TEST MANAGEMENT

By Michael L. Noble[1]

INTRODUCTION

The Blast and Shock field test management structure has been shaped by a blend of the program manager philosophy and the technical functional area structures. This integrative management approach in Blast and Shock field testing is given the title of matrix mamagement. This paper will discuss and outline the field test matrix management structure as it pertains to the Air Force's Blast and Shock testing. The Air Force Weapons Laboratory, Civil Engineering Research Division (AFWL/NTE) has been the responsible agent for Blast and Shock testing of the Nuclear Hardness and Survivability (NH&S) of protective structures and systems within the Air Force Systems Command. This organization's management structure will be presented. The discussion will focus primarily on the alignment of the field test's organizational structure and the technical integration roles and procedures.

DEFENSE SYSTEM POLICY

It is important to bring out the Air Force's macro program management policy. The Major Systems Acquisition regulations have a dominant role in structuring the primary test program objectives and milestones through which the Blast and Shock test management responds as a participating agency. These regulations state the policy for managing all Air Force acquisition programs which are funded through the Research, Development, Test and Evaluation appropriations. Responsibility for the management of acquisition programs is

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82-18

delegated to the implementing command. Each acquisition program will be managed by a single person known as the Program Manager (PM). The Program Manager role for the Air Force's test management is thus directed by regulation and provides the macro management cornerstone for any major defense system program.

The Program Manager is responsible for all management decisions within the approved acquisition program. The PM's decisions are directives on all participating commands. The program's tasks are contained in the Program Management Plan (PMP). This plan is the management outline through which the participating agencies lend their support to meet the program's objectives, constraints, and thresholds.

The system acquisition process is a sequence of specified phases and decision points directed towards the achievement of the DOD established program objectives in the acquisition of the defense system. The process is initiated with the approval of a mission need statement and extends through the successful completion of development on to system deployment.

The current system R&D process decision points identified with the separate phases of program activity are structured as follows:

<u>Milestone 0 - Program Initiation</u>

The Secretary of Defense requests, or a DOD Component Head perceives, a mission need to exist and determines that a new capability is to be acquired to meet the need. The DOD Component Head submits a statement of the mission need to the Secretary of Defense for approval to proceed, to identify, and to explore alternative solutions to the mission need. The considerations to support the determination of the mission need are documented in the Mission Need Statement (MENS).

The Secretary of Defense will approve the mission need and direct, one or more, of the DOD Components to systematically and progressively explore and develop alternative system concepts to satisfy the approved need.

Milestone I - Demonstration and Validation

When the DOD Component completes the competitive exploration of alternative system concepts to the point where the selected alternatives warrant system demonstration, the DOD Component Head requests approval to proceed with the demonstration and validation effort. The recommendations shall be documented in a Decision Coordination Paper (DCP) and reviewed by the Defense System Acquisition Review Council (DSARC) and the (Service) System Acquisition Review Council ((S)SARC) prior to the Secretary of Defense decision.

The Secretary of Defense action will reaffirm the mission need and approve, one or more, selected alternatives for competitive demonstration and validation.

Milestone II - Full-Scale Engineering Development

When the demonstration and validation activity has been completed, the Component Head is prepared to recommend the preferred systems for full-scale engineering development. The recommendations are documented in an updated DCP and reviewed by the DSARC and (S)SARC prior to the Secretary of Defense decision.

The Secretary of Defense will reaffirm the mission need, and approve the selection of a system for full-scale engineering development, including procurement of longlead production items and limited production for operational test and evaluation.

Milestone III - Production and Deployment

When the Component Head is prepared to recommend production of the system, the recommendations are documented in an updated DCP and reviewed by the DSARC and (S)SARC prior to the Secretary of Defense decision.

The Secretary of Defense will reaffirm the mission need, confirm the system ready for production, approve the system for production, and authorize the Component to deploy the system to the using activity.

MACRO-MANAGEMENT SUMMARY

Test and evaluation of any defense system shall commence as early as possible. Testing directly supports the system's estimates of military utility, operational effectiveness, operational suitability, and design modifications to meet mission requirements. These utility determinants shall be made prior to large-scale production commitments. The most realistic test environment possible and an acceptable model of the future operational system will be used in the testing. A specific test or test series, keyed to an appropriate decision point, will normally be conducted within each phase.[1]

The preceeding background reviews the present foundations of DOD management structuring: a PM policy and the decision point milestones. The typical system Research and Development (R&D) cycle, showing the phases and DSARC milestones, is shown in chart A. Thus, field testing has its macro operational management outline.

As of this writing, the DSARC process for system's R&D is being streamlined. It will cut the number of formal DSARC milestones from the present four to two. In brief, first it will meld the MENS point with the DSARC I milestone. Secondly, DSARC II was made the key decision point. The "go-ahead" decisions for both full-scale engineering development and production will be at DSARC II. This management direction clearly will increase momentum in the system acquisition R&D process. Regulations are pending on the new "tailored" DSARC system.

A point of discussion must be emphasized. The Air Force Systems Command (AFSC) conducts independently long-lead-time technology base programs,

[1] DOD Directive 5000.1, "Acquisition of Major Defense Systems," January 18, 1977.

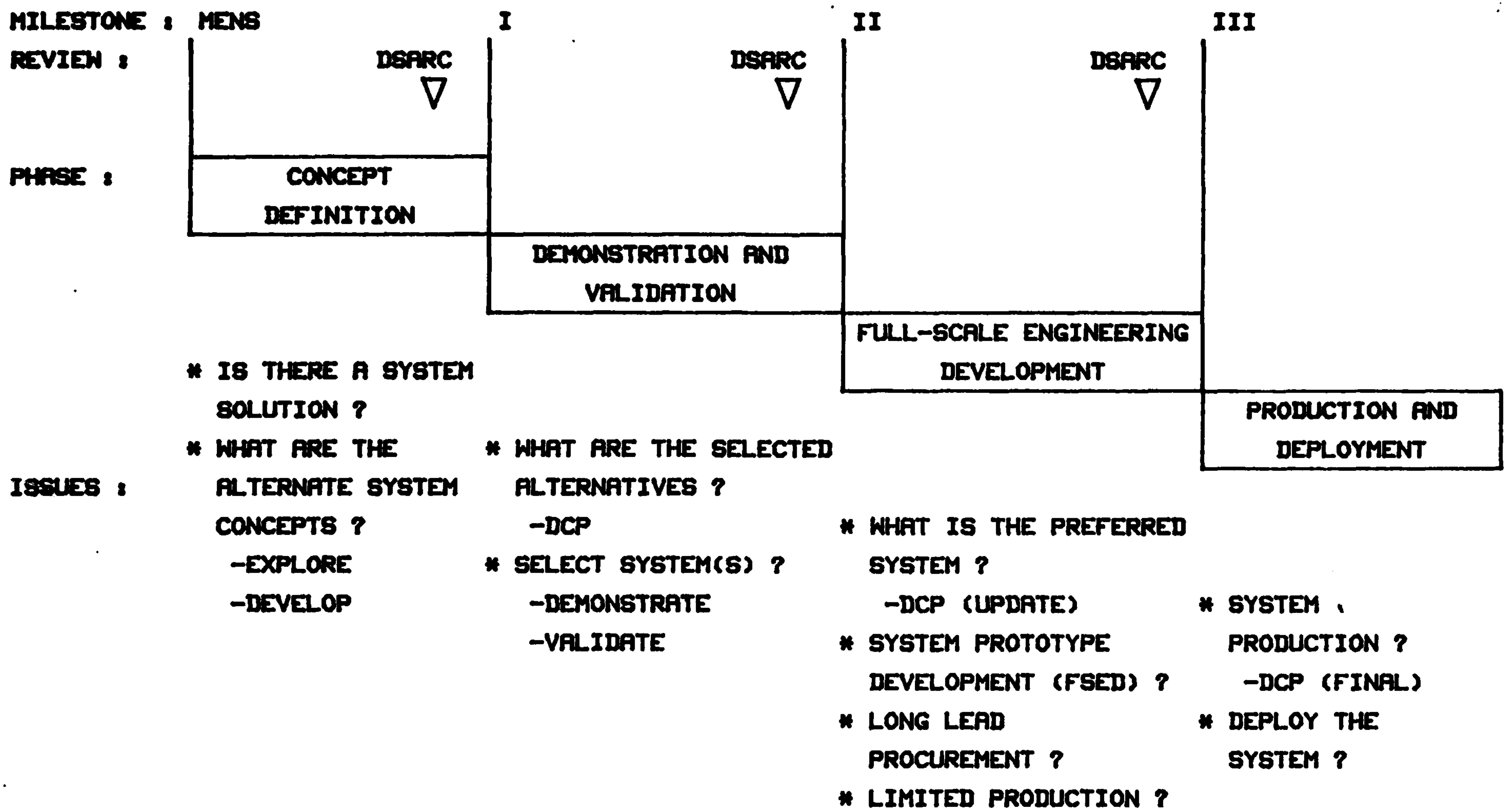


CHART A. SYSTEM RESEARCH AND DEVELOPMENT (R & D) CYCLE

deemed research and exploratory development, to support future acquisitions. In general, these programs are unconstrained from the system acquisition process due to the long-term needs time element. However, in developing research programs, the program management orthodox is parallel.

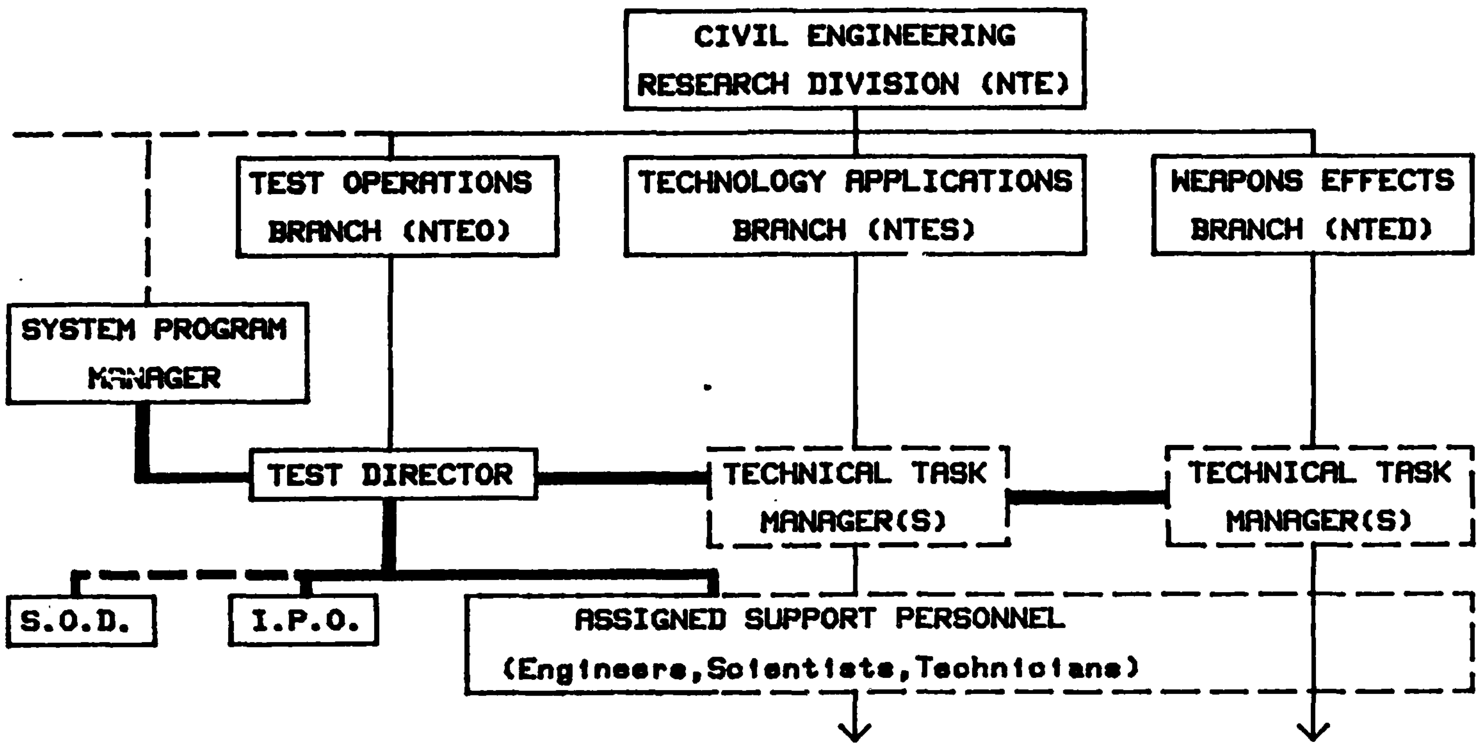
FIELD TEST MANAGEMENT OVERVIEW

The AFWL/NTE handles its Blast and Shock test management for either basic research or system related developmental/validation testing using the same approach. The only difference is in a programmatic sense, i.e., definition by DOD of a specific system. The use of a system directed test will be followed throughout this discussion.

Blast and Shock field testing is a direct statement towards achievement of a fundamental defense system mission need requirement. It exercises the system's NH&S capabilities. This assessment task is performed at early stages of system development and repeated as necessary throughout the design optimization process.

The maintenance of this ability to meet the system's field testing criteria is a mission responsibility of AFWL/NTE. The successful management of system field testing depends upon a strong and viable Blast and Shock technology base and field test support management organization. The ability to fluidly adjust the technical staff to meet the field test requirement is fundamental to the organization's mission responsiveness. Management must pattern itself to cross established functional area lines to obtain the necessary personnel to efficiently execute the technical tasks. The AFWL/NTE uses a matrix management approach to provide the program support service. The basic organizational form is depicted in chart B, entitled Matrix Organization.

It should be emphasized that a matrix management system has the strong potential to grow in an inter-organizational sense. This expansion process necessarily develops from the research concept to a system demonstration/validation testing phases. The SPO involvement becomes pronounced when



LEGEND

IPO	Instrumentation Project Officer
SOD	Site Operations Director
	Dotted line = Intra / Inter Organization Manning Selected
	Broad line = Matrix Flow

CHART B. MATRIX ORGANIZATION

alternative solutions are narrowed; a specific system is selected for proof-testing and prototype development. Also, with this programmatic shift brings the mandatory addition of a system program manager. However, lets proceed with the basic development of the Blast and Shock field test management structure.

Two basic management elements, whereby the nature of ones dependence on and adherence to, provide the structural framework for productive field test mangement. Those conditional elements are personnel and planning. Test planning is the primary requisite to insure that all technical tasks intermesh whereby progress is made to meet the objective, a successful field test execution. Test personnel provide the control to implement the test plan.

TEST PERSONNEL

The manpower involvement level for all field test management operations is directly dependent upon each test's magnitude. It is recognized that not all test programs are of the same scope; therefore, some of the positions described may be embodied in one individual.

In order to expedite flow of information, task accomplishment, and decision making, each test program has personnel designated by the technical area's leadership (Branch Chief) with the concurrence of the Division head. Major task requirements are coordinated through the technical task manager(s). Performance period scheduling and manpower commitments are coordinated through the responsible section chief, the administrative supervisor. Finally, the coordination of day-to-day activities involving technical support tasks flows horizontally between the individual test personnel. This lateral interaction is the central thrust of the matrix management organization. Once the line authority is cognizant of the individual(s) task, the direction and control of duties for each test will reside with the Test Director. The broad line segment in chart B shows the generalized AFWL/NTE organization established to implement the test.

The basic task and responsibilities of the primary test management personnel are the following:

Program Manager (PM)

Responsible for the coordination, scheduling, and overall program management of the blast and shock activity. Maintains the primary interface with the SPO and participating agencies line management. Defines program and test objectives. Ultimately responsible for the appropriate theoretical and experimental programs, budgets, and schedules which support the system's research and development.

Test Director (TD)

Responsible for all the facets of test direction, from planning through execution. Determines the priority, adequacy and the integrated design plan of experiments for the field test. Directs the test-related technical work and coordinates the Program Manager's test requirements. The essence of his task is patterned after the Air Force's PM philosophy. However, the scope is adjusted to be centered on a specific test event.

The TD's functional tasks include monitoring procurement actions and directing test scheduling. The scheduling effort is a critical role. The use of Critical Path Methods (CPM) is a managment tool which is highly recommended. He manages the test's budget, coordinates administrative requirements (test plan, construction drawings, and reports), and support functions (photo, fabrication, and meteorology).

The TD is the technical interface with both the test site personnel and the technical support personnel. All the test technical support requirements and experiments are approved by or requested through the Test Director. Participating agencies coordinate their activities through the Test Director and are responsible to the Site Operations Director during the

fielding of their experiments. All major changes must be approved by the Test Director, while minor field modifications approval coordination rests with the Site Operations Director. The intent is to have the Test Director responsible for all pertinent interfaces with the field operations and technical support units for the test. The Test Director is the integrator. He translates and conveys the test's technical tasks from the technical staff to the field operational personnel who are under the direction of the Site Operations Director (SOD).

Site Operations Director (SOD)

Responsible for all On-Site Test Operations. Reports directly to the Test Director. The SOD must be cognizant of the intent and purpose of all field experiments. A deviation of construction practices set down in the test plan and/or construction drawings may nullify either the experiment or compromise the test. The interdependence between the TD and SOD cannot be understated.

The Site Operations Director's functional tasks include both the management of field test support activities and assistance towards the execution of the test event. Responsible for on-site construction inspection, quality control, and test event firing. Specific delegated activities encompass the field operations integration; such as, facility operations, contract services, equipment and supplies, personnel administration, communications, security, and vehicles. Maintains the as-built working drawings and applies the field procedures for construction and other operational test support.

Instrumentation Project Officer (IPO)

Responsible for all instrumentation support required in the fielding of the test. This task encompasses the engineering of B&S measurement

techniques from gage to recorder. The IPO must integrate the measurement and recording equipment using a systems engineering approach. He must be cognizant of field emplacement techniques and be able to apply selected gage types to provide the experimenter's data. The management of van operations and recording practices is a field operational facet delegated from the Test Director.

The IPO's functional tasks include responsibility to procure, select, and provide order information for wire, cable, and transducers. He ensures that the field test's measurement requirements are coordinated and translated to gages in place and that data is properly calibrated, conditioned, and recorded. He publishes planned channel assignments and as-built measurement lists. He interfaces with data processing personnel to produce the data report.

Documentation is an essential responsibility, for it provides the link between the test design and product. The experimenter relies on accurate reporting of gage placement, as well as a complete record of the environment (waveforms).

Technical Task Manager(s)

Field testing requires select technology support. The translation of NH&S assessment support within technical functional areas is a method of providing a continuing expertise in select engineering and scientific disciplines. The technical support framework is held independent of the test requirements, thereby it can develop and progress with the state-of-the-art.

Within the organization's functional areas (Branches) are personnel whose task is to maintain each technical discipline. The TD coordinates with those technical task managers to develop and outline the test plan. Technical task managers also recommend individual support personnel for assignment on

the respective test. The task manager is responsible to insure the appropriate methodology is applied to the test effort. Some technical tasks which are maintained at AFWL/NTE are: siting (geology and geophysics); airblast phenomenology; ground shock phenomenology; cratering; debris and dust definition; instrumentation development and technology; effects simulation development and technology; structural loads and response technology; and systems assessment methods.

TEST OPERATIONAL PLANNING

Management Principles

Management planning's foundation is in controlling the fundamental measurands of task, schedule, and funding. Field test management necessarily must incorporate these "triple constraints" in its operational planning to effectively control the test program. Blast and Shock field testing is restrictive in its NH&S program character. Field testing is frequently constrained by both a fixed date decision point and a fiscal year funds ceiling. Thus, the test integrator's latitude diminishes to only one independently manageable parameter. This is the Work Breakdown Statement (WBS), with its derivative elements (task versus manpower) to apply towards test execution. Thus, a detailed development within this outline is required.

Test personnel must be bound in a unified commitment towards obtaining the specific goals and requirements set by the system's program manager. Engineers and scientists are regimented by their respective professions. Their technical outlooks, emphases, and methodologies are quite different. The TD's task and purpose is to blend their technical expertise to meet the test objectives. A means to that end is the test plan.

Test Planning Overview

A system oriented field test, by its very nature, is a short-term program occurrence. It has specific PM directed objectives to meet the

respective R&D phase's DSARC milestone. This situation requires a process by which the technical issues and procedures can be focused. The test plan produces the mechanism for quickly achieving technical tasks integration. A comprehensive test plan can bridge the specific test objectives and non-standard test requirements with standardized field operational practices. As with technical issues, the test plan binds the participating agencies. Organizational commitment is an important factor in a successfully managed test program. Without functional line management's approval and backing, the Test Director is essentially void of any authority to implement the test.

Test Plan

The test plan is a written outline formatting management means: test definitions, task assignments, and the technical/operational methodologies. It links the test objectives with the commitment of technical resources through a formalized document. Appendix I provides an example of the typical Blast and Shock (B&S) test plan's scope. The principle test plan control linkage, as stated previously, is the Work Breakdown Statement (WBS). A detailed WBS example for a multi-participant field test is developed in Appendix II. Critical in test development and planning is clarity of tasking. The WBS details the elemental tasks and sets, in parallel, the responsibilities. It is important to establish in the WBS structure both hardware and nonhardware deliverables. This action keys the participants into a responsive mode through the WBS checklist activity. Other plan annexes support the development of task and resource management by detailing the functional support areas. Principal annexes which carry a continual integrative responsibility (update) are: Schedule, Instrumentation Plan, and Construction Package. These annexes are implementative in nature and a great deal of participant interaction is concentrated in these areas. The questions of

"how" and "when" correlate directly with the proper utilization of the WBS, the allocaton of time and manpower. The test plan's overall purpose is to ensure the test objectives are met. Failure of one technical task to be completed on time or at the proper level of effort could quite possibly jeopardize the test execution, thereby seriously impacting the system's R&D milestone.

Test Program Controls

Control systems are invaluable tools to the TD. They provide WBS tasks forecasting of critical paths. Analysis techniques vary, but the program mangement thrusts remain constant. These techniques provide methods to highlight any task deviation and indicate a relative measure of the task magnitude. The techniques may range from a simple milestone-bar chart (detailing short-term deliverables) to a complex CPM network (showing the task interdependence and time scales). The author recommends a CPM for it will relate two important parameters: the task's schedule period and the task's interface logic. The use of program controls respective to support task personnel has minor utility. However, the TD is the true benefactor of this analysis. Its utility further increases with the test's technical complexity and multi-participant involvement. The Test Director must be able to control the course of all test activities. Program control techniques provide an activity road map for the Test Director to apply his management skills.

Reprogramming

A test program can only be responsive to the system's R&D needs if there are avenues for reprogramming actions. These actions normally occur at the macro-level upon R&D phase transitions; however, unscheduled program directives do occur with some frequency. System program modifications are inevitable.

The TD should set his own pattern of micro-level decision points. Develop a conscious attitude of periodically holding test program integration

checkpoints. Particularly, at the initial stages of test planning, it is essential to convey this tone. Vital test program technical issues are to be communicated. The TD must relate the test objectives in the proper context to all participants, develop the WBS commitments, and set the proper management interfaces between functional line management and the test matrix management. Constructive management practices communicate and convey, as well as integrate and direct. Why expect to have a participant commit to any test implementation if he was not a party to the test plan development.

The test plan is the embodiment of the system's current test requirements and specifications. The test momentum can only progress, if and only if, there is full cognizance.

The initial test plan must necessarily have an administrative revision procedure. When the test objectives change upon a major system level concept redirection, a more extensive feedback practice may be necessary, i.e., a comprehensive technical review.

Reviews

Technical reviews are an extension of reprogramming actions. Management reviews have a high frequency of occurrence; however, they differ greatly in purpose and style. The utility, as previously stated, lies in communication.

At AFWL/NTE, the principal reviews in which the TD institutes test program controls are: the initial test plan briefing, the construction package review, the field test management meetings (weekly) and the pre/post test data analysis briefings. The preceeding reviews are built into the test management outline.

During the course of the test program a broad spectrum of task specific technical interchange meetings take place. The majority of these

meetings are set at the technical task level and may generate into formalized task working groups. B&S field testing technical interchange areas which historically maintain a formalized state are: instrumentation, simulation, and pressure/crater related effects.

SUMMARY

The Air Force has developed a system management policy under which a program manager directs the macro-level R&D program flow. This philosophy of a single-point integrator is applied to AFWL/NTE's Blast and Shock field test program management.

The Test Director performs this role as integrator. He uses a matrix management approach in fulfilling the system's field test support requirements.

Matrix management is the organizational framework which enables AFWL/NTE to respond with the progressive nature of a system's R&D cycle. The matrix's horizontal decision and task flow can adjust to specific system test requirements and select technical expertise. The test support can progress without interfering with the fabric of technical functional area roles. The matrix management approach's essence is in the segregation of a short-term system field test program relative to the long-term research technology base development.

The field test operational planning and principal personnel are the basic management control elements. A dominant management practice of all the test personnel outlined is a knowledge of communication. The field test staff must communicate and convey technical tasks, as well as perform their integration and direction management responsibilities.

The management tools for a test program provide the mechanism for the test integration and direction. The key working document is the test plan. It brings into focus the system test objectives with the comprehensive annexes, detailed to specific test requirements and operational practices.

APPENDIX I - TEST PLAN (EXAMPLE)

SECTION I - INTRODUCTION

1. Objective. Discussion to provide foundation information to individuals or groups involved in planning, implementing, executing, and supporting the test operation.

2. Test Overview. Discussion giving the program baseline; i.e., mission needs, criteria, etc. for the Blast and Shock simulation of the nuclear environment on a system.

SECTION II - PROGRAM MANAGEMENT

1. Sponsors and Agreements.

a. Statement of program scope and directives for the test is being sponsored by the System Program Office (SPO). Select excerpts from the program plan specific to the testing support.

b. Memorandum of Agreement.

2. Test Direction and Technical Supervision. Test direction and technical supervision is the responsibility of

Discussion on the authority necessary to perform the fielding of this experiment being delegated to the Test Director and functional relationships with the line authority.

3. Organization and Responsibilities. (See Annex)

SECTION III - DESCRIPTION OF TEST

1. Requirements and Justification: SPO directed requirements, AFR 80-38, etc. (Specify applicable portions, and use direct quotes.)

2. Type of Test and General Descriptions (Succinct general statements)

a. The overall objectives of this test are:

(1) To develop

(2) To demonstrate

(3) To validate

b. General background on field testing techniques, if required.

3. Technical Discussion: Approximately 250 words - details of #2

4. Operations Approach: (overview)

a. Work Breakdown Statement (WBS) (see Annex)

b. Schedule (see Annex).

c. Construction Package (see Annex)

OUTLINE

Annex	Description	Responsible Annex Executor	Annex Writer	Revision
A	Location and Site Description (with Site Support Layout)			
B	Geology and Geophysics (Site)			
C	Schedule			
D	Test Organization (Chart)			
E	Safety Plan			
F	Test Event Operations Plan			
	-Explosives Transit and Storage			
	-Dry Run Procedures			
	-Test Arming & Firing Checklist			
	-Critical Measurements List			
	-Hold Conditions & Procedures			
	-Misfire Procedures			
	-Pre/Post Event Procedures			
G	Security Plan (Site)			
H	Security Classification (Documents, Data, Briefings)			
I	Environmental Impact Assessment			
J	Environmental Effects Monitoring			

Appendix I

Annex	Description	Responsible Annex Executor	Annex Writer	Revision
K	Communications Plan			
L	Meteorological Support Plan			
M	Photo Plan			
N	Construction Package (Drawings and Procedures)			
O	Instrumentation Plan			
P	Data Reduction & Analysis			
Q	Technical Reports (Requirements & Schedules/Philosophy/Briefings)			
R	Theoretical Support			
S	Travel & Billeting Procedures			
T	Vehicle and Equipment Control Procedures			
U	Community Relations			
V	Funding			
W	Equipment/Data Listings (GFE/GFD, CFE/CFD)			

Note: 1. The Test Director is the coordinator for assembling the Test Plan.

2. Executor(s) listed above may change for a given test dependent on when, where and how it is performed.

APPENDIX II - BLAST AND SHOCK TEST REQUIREMENTS AND RESPONSIBILITIES

Legend: A - Primary Agency
B - Secondary Agency
C - Tertiary Agency

WORK BREAKDOWN STATEMENT (EXAMPLE)

WORK UNIT	PERFORMER	APPROVING AUTHORITY	COMMENTS
1. General Requirements (criteria)	B	B	
a. Geology	B	B	
b. Simulation	B	B	
c. Structure	B	B	
2. Preliminary Design (Measurement List & Plans)	A	A	
a. Ground Shock	A		
b. Simulation	A		
c. Structure	A		
d. Development	A		
3. Site Investigation	A/B	A/B	
4. General Inst. Req. (Test Plan)	A		
5. Preliminary Analysis	A		
6. Testbed Design	A	A	
a. Instrumentation Layout	A		
b. Gage Ranging	A		
c. Trench Plan	A		
7. Instrumentation Systems Plan and Procedures	A	A	
8. Final Structure Design Drafting	A	A	
9. Final Simulator Design Drafting	A	A	
10. Final Test Plan w/Drawings and Procedures	A	A	
11. Test Plan Reviews	A	A	
12. Precast Structure Fab	A	A	
13. Simulator Materials	A	A	

	WORK UNIT	PERFORMER	APPROVING AUTHORITY	COMMENTS
14.	Testbed Inst. Materials (%GFE)			
	a. Structural - Cast Gages (100%)	A		
	b. Structural - Other (100%)	A		
	c. Simulator - (100%)	A		
	d. Free-Field (100%)	A		
	e. Developmental (100%)	A		
	f. Camera Protection, Camera Control, Suspended Mounts and Light Boards	C		
	g. Cameras, Film and Batteries	A	A	Aerial Photo is GFD
15.	Field Inst. Mat. (% GFE)		A	
	a. Cable (100%)	A		
	b. Recording Eqpmnt (100% GFE)	A		Including recording materials and spares
	c. Bunkers (100%)	A		
	d. Pre-Amplifiers (100%)	A		
16.	Instrumentation Calibration	A	A	
17.	Test Logistics (Site)	B	A,B	
	a. General	B		
	b. Instrumentation Installation Material Crimps, Wire, etc.	B,C		
	c. Precast Structure Shipment	B		
18.	Testbed Construction	B	A,B	
	a. Construction and Installation Support Work Package	C		
	b. Construction and Test Integration Management	C		
	c. Preparation (Survey, Siting, Digging)	B		
	d. General Tasks (Welding, Carpentry etc)	B		
	e. As-Built Drawings	C		
	f. Inspections	A,B,C		
	g. Simulator	B		
	h. Structural (Install)	B		
	i. Gage (Install)	A,C		
	j. Photo (Fab & Install)	A,C		
	k. Cables (Install)	C		Lay all cables and connect I-Van. A splices all gages.

	WORK UNIT	PERFORMER	APPROVING AUTHORITY	COMMENTS
19.	Pretest Predictions (Analysis)	A	A	To participate as part of transition (over the shoulder training)
20.	Pretest Reports	A	A	To participate as part of transition (over the shoulder training)
21.	Test Instrumentation Recording			
	a. Environmental Monitoring	A		
	b. Van Preparation (Dry Runs)	A		
	c. Pre-Amplifier (Checkout)	A		
	d. Photo	A,C		
	e. Test Event Data Acquisiton	A		
	f. Photo Control System Support	C		
22.	Test System (Dry Run)	A	A	
23.	Test Readiness Review	A,B,C	A,B	
24.	Test Execution	A		
25.	Post-Test Analysis			
	a. Post-Test Inspection	A,B,C	A,B	
	b. Data Processing (100% GFE)	A		
	c. Data Analysis	A		
	d. Quick-Look Report (30 days)	A		
	e. Corrected Data Analysis	A		
	f. Data Report	A		
	g. Final Report	A		
26.	Post-Test Cleanup	B		

BLAST AND SHOCK FIELD TEST MANAGEMENT

KEY WORDS: Military Engineering; Organizations; Planning; Tests; Program Manager; Matrix Management; Test Director; Test Integrator; Blast and Shock Testing

ABSTRACT: Matrix management functions as the principal field test management technique. The key is integrating the functional technology areas and a field test support organization. The Blast and Shock Field Test Management structure for ballistic missile acquisitions system's test integrator role has changed responsibility among several different organizations and site operating locations. However, management's logic plan for accomplishing a multi-participant field test has basically remained constant. The program's flow for the performance of a field test is directed from the system's program manager through major decision points, with select developmental milestones. Blast and Shock field test provides a direct statement, through the exercising of the system's Nuclear Hardness and Survivability (NH&S) capability, in meeting select decision point needs. A test integrator (test director) is the responsible agent in the management of any Blast and Shock field test program. The central thrust of the discussion is to present the Air Force Weapons Laboratory, Civil Engineering Division's (AFWL/NTE) integrative (matrix) structure with its test planning and operating elements.

Blast and Shock Field Test Management, by Michael L. Noble. The matrix management technique is presented as a principal field test management structure. The test integrator (test director) is the responsible agent in coupling the functional technology areas and a field test support organization. Planning and operating elements are presented.

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